

# FOOD OF JUNGLE BABBLER AND COMMON BABBLER: A COMPARATIVE STUDY<sup>1</sup>

MANJIT S. SAINI, MANJIT S. DHINDSA, HARJEET K. SAINI AND H.S. TOOR<sup>2</sup>

(With four text-figures)

**Key words:** babblers, *Turdoides striatus*, *T. caudatus*, feeding ecology, dietary overlap, economic status

Food of the Jungle (*Turdoides striatus*) and Common Babblers (*T. caudatus*) was studied gravimetrically in an intensively cultivated habitat at Ludhiana (India). In both the species, plant matter accounted for >50% of the diet. The remaining portion consisted mainly of insects, while snails (Mollusca) and spiders (Arachnida) formed <1% of the diet. Much of the identifiable bulk of plant matter included pulp of fruits, pearl millet, wheat and leafy material. In *T. striatus*, lepidopterans were the most preferred food as they alone accounted for about 18% of the diet. The other insect orders represented were Orthoptera (5.8%), Hymenoptera (5.7%) and Coleoptera (4.3%). In *T. caudatus* also, lepidopterans were predominant in the diet (16%) followed by coleopterans (8.7%), hymenopterans (5.0%), orthopterans (2.6%) and isopterans (2.5%). Many insect species consumed by both babbler species were pests of the common crops or stored grains. Food niche breadth and dietary overlap of the two species were also calculated.

## INTRODUCTION

Babblers are among the common birds of India. In Punjab, five species of babblers, namely Large Grey Babbler (*Turdoides malcolmi*), Jungle Babbler (*T. striatus*), Common Babbler (*T. caudatus*), Striated Babbler (*T. earlei*) and Yellow-eyed Babbler (*Chrysomma sinense*) are found (Toor *et al.* 1982). Of these, the first three species are quite abundant. Their food has been studied in Rajasthan (Rana 1970a, b) and Uttar Pradesh (Narang 1986, Narang and Lamba 1986). From Punjab, however, information on food is available on only one species, namely the Large Grey Babbler (Toor and Saini 1986).

Studies on feeding ecology of birds inhabiting intensively cultivated areas are of special interest because of the predominance of food grains in such areas may influence food selection and thereby result in dietary shifts in some species. Such type of shift has actually occurred in the European Starling (*Sturnus vulgaris*; Feare 1989). In this paper we describe results of a study on the food of Jungle

Babbler and Common Babbler carried out in an intensively cultivated area of Punjab (India). The objectives of this study were: (i) to make a quantitative analysis of the food, (ii) to study seasonal changes in diet diversity, (iii) to evaluate dietary overlap between the two species, and (iv) to compare food of these species with that recorded in Rajasthan and Uttar Pradesh.

## MATERIAL AND METHODS

The study was carried out in the field area of Punjab Agricultural University, Ludhiana (30°56' N, 75°52' E, c. 247m above the mean sea level). The area is intensively cultivated with two main crop seasons: *rabi* (October-November to April-May) and *kharif* (June-August to September-December). Predominant crops of *rabi* season are wheat (*Triticum aestivum*), toria (*Brassica campestris*), raya (*B. juncea*), sugarcane (*Sachharum officinarum*), lentil (*Lens esculenta*) and gram (*Cicer arietinum*). Those of *kharif* season include rice (*Oryza sativa*), cotton (*Gossypium* spp.), maize (*Zea mays*), pearl millet (*Pennisetum typhoides*) and groundnut (*Arachis hypogaea*). The climate of the study area is semi-arid monsoon type. Generally,

<sup>1</sup>Accepted October 1992.

<sup>2</sup>Department of Zoology, Punjab Agricultural University, Ludhiana-141 004, India.

four seasons are experienced in a year: summer (April-June), monsoon (July-September), post-monsoon (October-November) and winter (December-March).

Babblers were shot with an air gun. In total 71 Jungle Babblers and 39 Common Babblers were collected. The guts (oesophagus and stomach) were taken out immediately after shooting and the contents washed through a fine sieve. Washed gut contents were dried on blotting papers for 15-20 min. at room temperature. Animal and plant matter was sorted and weighed on an electric balance true to 0.001 g. After weighing, the plant matter was preserved dry while animal matter was preserved in 70% alcohol for further identification. Two indices of food-niche breadth (Krebs 1989), namely Shannon-Wiener index ( $H'$ ) and Levins' index ( $B$ ) were calculated as follows:

$$H' = - \sum P_i \log P_i,$$

and

$$B = 1 / \sum p_i^2$$

where,  $p_i$  is the proportion of the  $i$ th food type in the diet. Levins' index was standardized to express it on a scale of 0 to 1.0 following Hurlbert (1978) as:

$$B_A = (B-1)/(n-1)$$

where,  $B_A$  is Levins' standardized niche breadth, and  $n$  is the number of food types recorded.

In addition to the gut content analysis, babblers were observed in the field through 7 x 50 field binoculars periodically at different times of the day to record observations on their feeding behaviour, feeding sessions and feeding associations with other birds.

## RESULTS

**Feeding behaviour:** Both species of babblers were resident in the study area. Jungle Babblers preferred thick woody vegetation and fed efficiently on trees. They clung to and hung from the branches to capture insects and to take pecks at leaves. However, Common Babblers preferred low vegetation and remained restricted to bushes in dry areas. They fed mainly under or near bushes but

occasionally also out in the open.

Jungle Babblers were observed to feed on pear (*Prunus persica*) fruits in orchards during June and July. However, they ate only those fruits which had already been damaged by Rose-ringed Parakeets (*Psittacula krameri*). Common Babblers fed on pearl millet from July to September. In winter months, they consumed wheat and rice grains shed on the ground but rarely attacked standing crops. Probably because of their apparent shy nature, Common Babblers did not mix with other bird species. However, they sometimes fed in association with House Sparrow (*Passer domesticus*), Weaverbirds (*Ploceus* spp.), Whitethroated Munia (*Lonchura malabarica*), Spotted Munia (*L. punctulata*) and Common Myna (*Acridotheres tristis*).

**Food of adults:** In both species, plant matter accounted for more than 50% and animal matter about 44% of the diet (Table 1). Grit comprised about 2% of total contents in Common Babbler but only 0.1% in Jungle Babbler.

A major portion of plant matter (22-33%) could not be identified. Of the identified bulk, pearl millet represented about 5% of the diet in Jungle Babbler and 13% in Common Babbler. Wheat constituted 3-4% of the diet in both the species, whereas, rice was eaten only by the Common Babblers, making about 3% of total intake of this species. Common Babblers consumed more leafy material (9%) than Jungle Babbler (3%). Crushed seeds and pulp of fruits formed a considerable portion of the diet of Jungle Babblers but were not recorded in Common Babblers. Weed seeds were consumed in meagre proportions by both species.

Among animal matter, insects represented 34-35% of the diet in the two species. Lepidopterans were predominant insects as they alone constituted 16-18% of the diet. In Jungle Babblers these were followed by orthopterans (5.8%), hymenopterans (5.7%) and coleopterans (4.3%). However, in Common Babblers, coleopterans (8.7%) and hymenopterans (5.0%) ranked second and third respectively in order of relative abundance in diet, while orthopterans formed only 2.6% of the diet.



TABLE I  
FOOD OF JUNGLE BABBLER AND COMMON BABBLER

Food Items	Jungle Babbler (n = 71)	Common Babbler (n = 39)
<b>ANIMAL MATTER</b>		
Phylum Mollusca	0.23	0.32
Phylum Arthropoda		
Class Insecta		
Hymenoptera	5.70	4.99
Coleoptera	4.26	8.66
Lepidoptera	18.18	16.03
Orthoptera	5.80	2.59
Isoptera	0.48	2.49
Diptera	0.28	—
Total insects	35.40	34.26
Class Arachnida	0.61	T
Unidentified animal matter	7.78	9.24
Total animal matter	44.02	44.32
<b>PLANT MATTER</b>		
Pearl millet	5.29	13.22
Wheat	4.25	3.21
Rice	—	2.92
Weed seeds	0.30	1.26
Crushed seeds	4.19	—
Leafy material	3.44	9.37
Unidentified plant matter	32.92	22.34
Pith	5.40	—
Total plant matter	55.81	53.22
<b>GRIT</b>	0.13	2.34
Food Diversity ( $H'$ )	0.93	0.98
Levins' Index ( $B_{\lambda}$ )	0.31	0.54

T = trace.

Isopterans and dipterans were consumed in very small quantities by Jungle Babblers (<1% of food). However, in Common Babblers isopterans formed 2.5% of the diet, and dipterans were not consumed at all. Snails (Mollusca) and spiders (Arachnida) formed less than 1% of the diet in both species.

The values of the indices of food niche breadth were more in Common Babbler than in Jungle Babbler (Table 1). Dietary overlap between the two species was 53%.

**Seasonal changes in food:**

**JUNGLE BABBLER:** In Jungle Babbler, the relative consumption of animal matter was more than that of plant matter during August and September and

almost equal in October (Fig. 1A). During this period, grasshoppers (Orthoptera) were taken most frequently and constituted the major portion (15-22%) of the diet (Fig. 2) Lepidopterans (13%) were the second abundant food type followed by Hymenopterans (5-9%) and Coleopterans (5-14%). Isopterans (5%) and Dipterans (1%) were also consumed in small amounts during this period. Jungle Babblers also consumed spiders during this

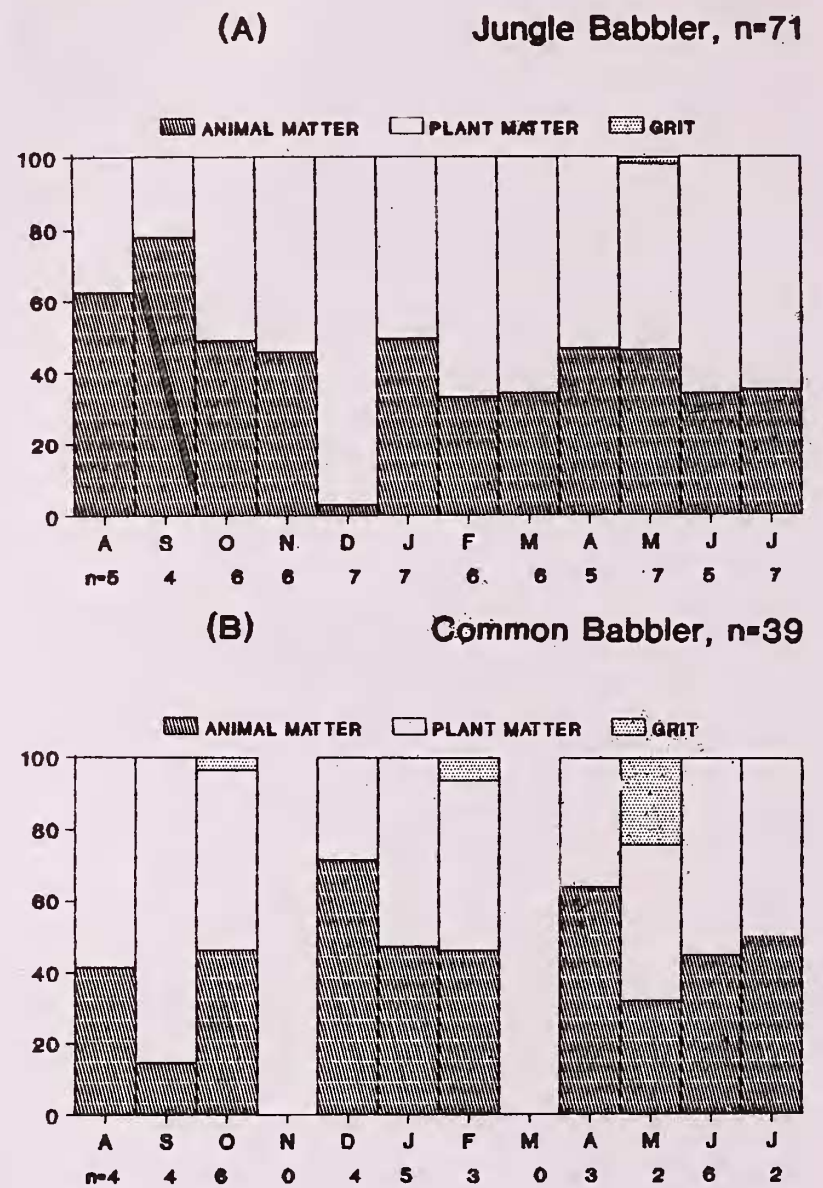


Fig. 1. Seasonal variations in the relative proportion of animal and plant matter in the diet of (A) Jungle Babbler and (B) Common Babbler (n = sample size.)

period but in small quantities (1-2%). Pearl millet (3-33%) was the main food type in the identified bulk of plant matter. In winter (November — February), the quantity of plant matter consumed by Jungle Babblers was more than that of animal matter. A large proportion of plant matter could not

be identified, but the identified bulk mainly comprised crushed seeds (13-30%) and wheat (3-6%). Leafy material formed less than 5% of the diet in January. Among the animal matter, lepidopterous larvae (16-39%) and ants (3-10%) were the two main food types. From March to July the plant matter remained dominant in the diet of Jungle Babblers. Wheat (4-21%) constituted the major part and was also the most frequently taken food type. Leafy material formed 38% and crushed seeds 6% of the diet in March. In June (33%) and July (43%), large amounts of pulp of pear fruit was eaten. Grit was also recorded in the gut contents of Jungle Babbler in May.

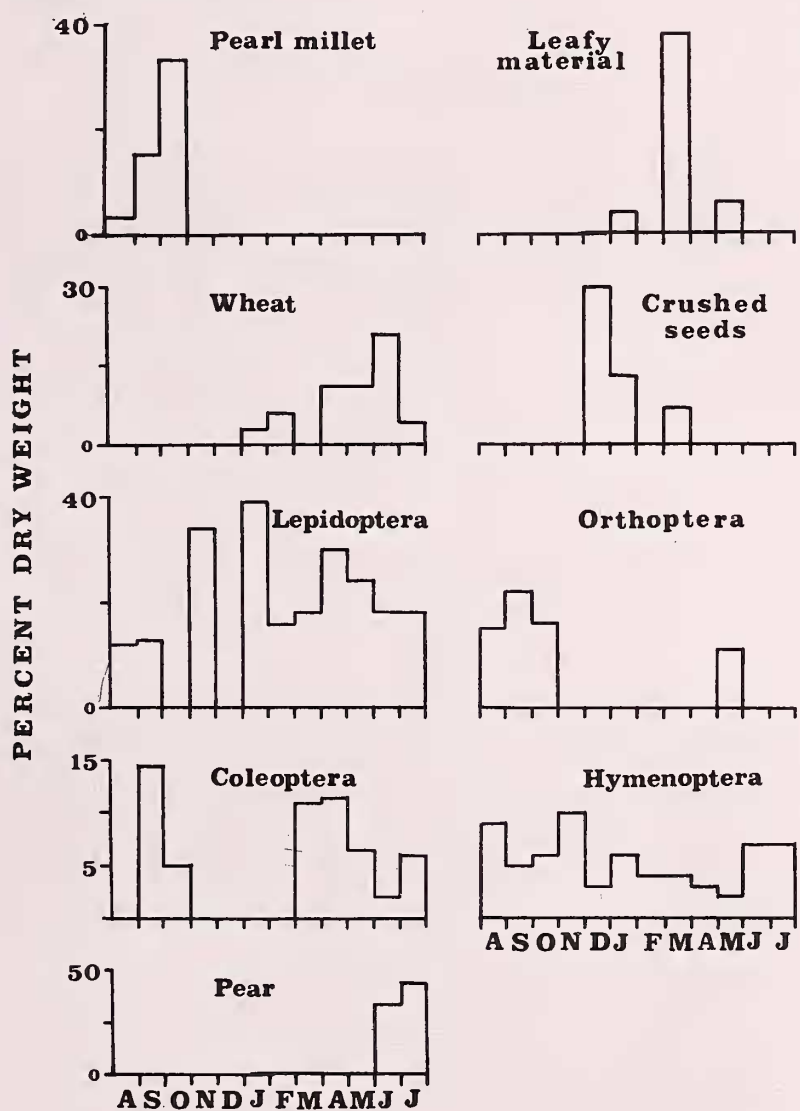


Fig. 2. Seasonal variations in the relative proportion of some important food types in the diet of Jungle Babbler.

**COMMON BABBLER:** Common Babbler also consumed greater quantities of plant matter than animal matter from August to October (Fig. 1B).

The major portion of plant matter eaten was pearl millet (6-66%, Fig. 3). Leafy material (3-15%) was also taken in large amounts. Weed seeds (<2%) and wheat (about 1%) were consumed only in small quantities. Among animal matter various insect orders recorded in the diet in decreasing order were: Lepidoptera (12-14%), Coleoptera (7-10%), Orthoptera (7-9%) and Hymenoptera (1-2%). Snail

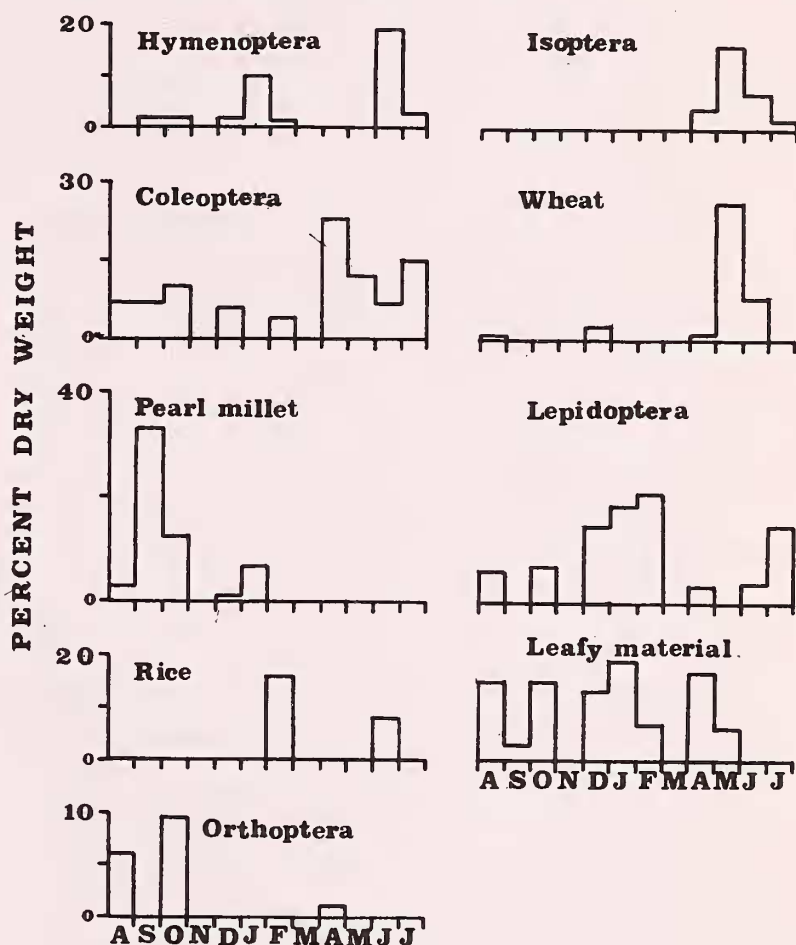


Fig. 3. Seasonal variations in the relative proportion of some important food types in the diet of common Babbler.

shell pieces were recorded only in August and constituted less than 1% of the diet. From December to February the relative proportion of animal matter in the diet of Common Babblers increased compared with plant matter (Fig. 1B). Consumption of beetles (Coleoptera) decreased during these months, that of ants (Hymenoptera) remained constant, while an increase in Lepidoptera was observed. In the identified portion of plant matter, significant amounts of leafy material (7-19%) were consumed during these months. Other food types in plant matter were: weed seeds (3-5%), pearl millet (2-13%) and rice (16%, recorded only in February).

In April, the consumption of animal matter



was more (64%) as compared to plant matter (36%, Fig. 1B) whereas, in May and June the trend was opposite. However, in July both animal and plant matter were consumed in equal amounts. From April to July, among plant matter, wheat and leafy material were the two food types taken in large quantities (Fig. 3). Other food types recorded in small amounts were rice and weed seeds. Among animal matter, consumption of coleopterans increased during these months. Lepidopterans were also consumed in small proportions except in July when these made 29.4% of the food.

#### Seasonal variation in food niche breadth:

Seasonal variations in the Shannon-Wiener index of food niche breadth revealed that food of Jungle Babbler was more diverse from August to October and May to June than during the rest of the year (Fig. 4A). The maximum value of Shannon-Wiener index was observed in September (0.8) and lowest in December (0.32). Similarly, the maximum value of Levins' index was found in September (0.8) and lowest was in November (0.27). In other months, Levins' index (0.3-0.6) as well as Shannon-Wiener index (0.5-0.7) fluctuated within a narrow range (Fig. 4A). In the Common Babbler the highest value of Shannon-Wiener index (0.88) was observed in October and lowest value in September (0.51, Fig. 4B). However, the maximum value of Levins' index was recorded in May (0.74) and lowest in September (0.17).

#### DISCUSSION

Both species of babblers were omnivorous consuming almost equal proportions of animal and plant matter. However, interspecific differences in diet were prevalent. For example, the amount of coleopterans consumed by Jungle Babbler was about half the amount eaten by Common Babblers. An exactly opposite trend was observed in the consumption of orthopterans; the consumption of these insects by Jungle Babbler was double the consumption by Common Babbler. Among plant food types, Common Babblers consumed large amounts of pearl millet and leafy material, whereas, the diet of Jungle Babbler was mainly composed of

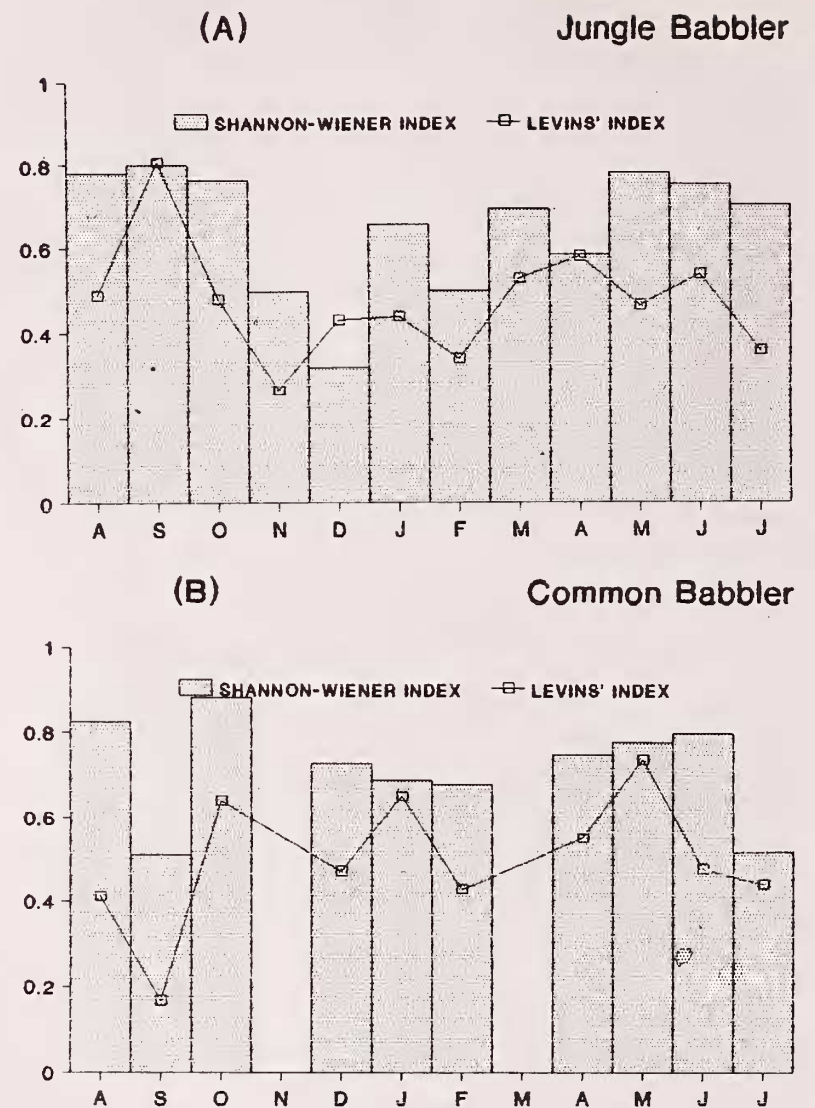


Fig. 4. Seasonal variations in diet diversity of (A) Jungle Babbler and (B) Common Babbler.

seeds and fruit pulp. These differences must be useful in reducing competition for food between these species should the food become limiting. Different food preferences of sympatric species to reduce interspecific competition for food is, in fact, necessary for their survival (Kear 1962, Schoener 1965, Lack 1966). Differences in the diet may also be related to the spatial distribution and the differences in bill size of the species (Newton 1967, Willson 1972, Gaston 1978, Crase and DeHaven 1978). Most probably, the larger bill of Jungle Babblers ( $25.10 \pm 0.84$  mm) enables them to capture the grasshoppers and to feed on fruits more efficiently, whereas, with smaller bills ( $21.86 \pm 1.52$  mm). Common Babblers can more easily and efficiently handle beetles and grains of pearl millet

(Saini 1982). Contrary to our results, Rana (1970a) reported that in Rajasthan both Jungle Babblers and Common Babblers fed predominantly on plant matter which represented more than 70% of the diet. Insects formed only about 25% of the diet in his study. These differences may be due to the differences in relative availability of different food types in Punjab and Rajasthan because of different climatic conditions. Narang and Lamba (1986) studied the food of Common Babblers at Dehra Dun and found the species to be omnivorous. In their study, vegetable diet included berries of *Lantana camara* and grains of wheat and paddy, and animal matter consisted of grasshoppers, ants, termites and beetles. However, their results were based on combination of gravimetric and volumetric methods and hence are not comparable to ours.

In both the species of babblers, frequency of occurrence of parts of beetles (Coleoptera) and ants (Hymenoptera) in the gut contents was more than any other insect group. It may not be true to consider that these are the preferred food items because these hard bodied insects may be digested slowly by the birds and thus are usually recovered in more guts. Kalmbach and Gabrielson (1921), while describing the food of starlings, have also stated that coleopteran parts remain for a longer time in the gizzards and their importance gets exaggerated. Moeed (1980) has also supported this view.

Seasonal variation in the food of both the species exhibited a different pattern. During August to October Jungle Babbler fed mainly on animal matter especially, grasshoppers, caterpillars and beetles, whereas, Common Babblers consumed large amounts of plant matter (mainly pearl millet) during this period. Similarly in winter (December to March) Jungle Babbler fed more on plant matter, whereas, Common Babblers consumed animal matter in greater quantities. During winter season per cent increase of lepidopterous larvae in the gut contents suggests that the babblers feed on hibernating larvae. This habit may be contributing towards the reduction in the carry over of the populations of these insects to the next season. It is

only during march to July, that plant matter remained dominant in the food of both the species of babblers. Wheat and leafy material were the main food items of the species during the season. In addition to it Jungle Babbler incorporated large amounts of pulp of pear fruits in the diet, whereas, Common Babblers fed on rice grains, taken most probably from the rice nurseries. In Rana's study on babblers, pearl millet was the predominant food of Jungle Babblers throughout the year except during July to September when insects constituted about 54% of the diet. In our study Jungle Babblers consumed pearl millet in significant amounts only in September and October, which is the harvest period of this crop in Punjab. In Rajasthan, Common Babblers consumed large bulk of insects only during March to September (Rana 1970a), whereas, in our study insects formed a significant proportion of the diet throughout the year except in September when pearl millet constituted about 65% of the diet.

In Jungle Babbler the food was more diverse from August to October as they fed on a wide variety of insects and plant matter. In other months, the two indices of food niche breadth fluctuated within a narrow range. However, the lowest diversity recorded in December was due to the intake of large amount of plant matter in the diet. Similarly in Common Babblers the recorded low diversity in September was due to predominance of pearl millet in the diet.

**Economic status:** Both the species of babblers are omnivorous as they incorporate large amounts of plant matter as well as animal matter in their diet. Among animal matter, insects formed a predominant proportion of the diet. Most of the insects consumed are pests of various crops (Table 2). The identified insects were curculionids (pests of stored grains), chrysomelids (serious pests of cucurbits), coccinelids (pests of vegetables), calliphorids (saprophagous flies), acridids (phytophagous hoppers) and pentatomids (sap sucking insects). The snails consumed by babblers are known to be vectors of infectious diseases of livestock. Jungle Babblers and Common Babblers



TABLE 2

## ANIMALS IDENTIFIED FROM GUT CONTENTS OF THE ADULTS OF JUNGLE BABBLER AND COMMON BABBLER

Animal	Jungle Babbler	Common babbler	Remarks
Phylum Mollusca			
Class Gastropoda			
Order Monotocardia			
Family MELANIIDAE			
<i>Melanoides tuberculatus</i>	+	+	
Phylum Arthropoda			
Class Insecta			
Order Coleoptera			
Family CURCULIONIDAE			
<i>Sipalus</i> sp.	+	—	Phytophagous weevils, damage stored grains Stem borers and leaf feeders
<i>Mylocerus</i> sp.	—	+	
<i>Astycus</i> sp.	—	+	
<i>Episonus</i> sp.	—	+	
Family CHRYSOMELIDAE			
<i>Neorthea fulva</i>	+	—	Serious pest of cucurbits
Family COCCINELLIDAE			
<i>Scymnus</i> sp.	+	—	Destructive to vegetables
Family ELATERIDAE			
	—	+	
Order Diptera			
Family CALLIPHORIDAE			
<i>Calliphora</i> sp.	+	—	Saprophagous fly
Order Hymenoptera			
Family FORMICIDAE			
<i>Pheidole</i> sp.	+	+	
<i>Cataglyphus bicolor</i>	+	—	
Order Orthoptera			
Family ACRIDIDAE			
<i>Acrotylus</i> sp.	+	+	
<i>Acrida</i> sp.	+	—	Phytophagous hoppers, feed on leaves of rice, grasses and millets
<i>Colemania</i> sp.	+	—	
Family TETTIGONIDAE	—	+	
Class Arachnida			
Order Araneae			Spiders in general are predators of insect pests and thus useful animals
Family SALTICIDAE	+	—	
Family CLUBIONIDAE			
<i>Clubiona</i> sp.	+	—	

feed on pearl millet during the postmonsoon months, but the damage is not of much concern in our area as this crop is cultivated as fodder only. Wheat and rice grains are consumed in small quantities and those too are taken from the ground, where they fall as a result of damage by other birds. Jungle Babblers do some damage to pear fruits during June and July, but this damage is not of primary nature as babblers mainly feed on only those fruits which have already been damaged by Rose-ringed

Parakeets. Therefore, the present studies reveal that babblers are useful species in relation to agriculture as they keep an efficient check on various types of insects which are injurious to our crops and stored grains.

## ACKNOWLEDGEMENTS

We wish to thank Dr. J.S. Mann for help in identification of insects. This study was supported by the Indian Council of Agricultural Research, New Delhi.

## REFERENCES

- CRASE, F.T. & R.W. DEHAVEN (1978): Food selection by five sympatric California blackbird species. *California fish and game* 64:255-267.
- FEARE, C.J. (1989): The changing fortunes of an agricultural pest: the European Starling. *Agric. Zool. Rev.* 3: 317-342.
- GASTON, A.J. (1978): Ecology of Common Babbler *Turdoides caudatus*. *Ibis* 120: 415-432.
- HURIBERT, S.H. (1978): The measurement of niche overlap and some relatives. *Ecology* 59:67-77.
- KALMBACH, E.R. & I.N. GABRIELSON (1921): Economic value of the Starling in United States. US Dep. Agric. Bull. No. 868.
- KEAR, J. (1962): Food selection in finches with special reference to interspecific differences. *Proc. Zool. Soc., London* 138: 163-204.
- KREBS, C.J. (1989): *Ecological Methodology*. Harper & Row: New York.
- LACK, D. (1966): *Population Studies of Birds*. Oxford University Press, London, P. 341.
- MOEED, A. (1980): Diets of adults and nestling starlings (*Sturnus vulgaris*) in Hawkes Bay, New Zealand. *N.Z.J. Zool.* 7: 247-256.
- NARANG, M.L. (1986): Contribution to the food of Common Babbler *Turdoides striatus* (Dumont). *Indian J. Forest* 9: 140-145.
- NARANG, M.L. & B.S. LAMBA (1986): Food habits of Jungle Babbler *Turdoides striatus* (Dumont) and its role in the ecosystem. *Indian J. Ecol.* 13: 38-45.
- NEWTON, I. (1967): The adaptive radiation and feeding ecology of some British finches. *Ibis* 109: 33-98.
- RANA, B.D. (1970a): Some observations on the food of the Jungle Babbler *Turdoides striatus*, and the Common Babbler *Turdoides caudatus* in the Rajasthan desert, India. *Pavo* 8: 35-44.
- RANA, B.D. (1970b): Winter food of the Common Babbler (*Turdoides caudatus*) in Rajasthan. *Indian Forester* 96: 153-155.
- SAINI, M.S. (1982): Feeding ecology of the babblers of Punjab with special reference to the Large Grey Babbler *Turdoides malcolmi* (Sykes). M.Sc. Thesis, Punjab Agricultural University, Ludhiana.
- SCHOENER, T.W. (1965): The evolution of bill size differences among sympatric cogenetic species of birds. *Evolution* 19: 189-213.
- TOOR, H.S., A.K. CHAKRAVARTHY, M.S. DHINDSA, P.S. SANDHU & P.K. ANANDA RAO (1982): A checklist of the birds of Punjab and Chandigarh. Bico printers, Ludhiana.
- TOOR, H.S. & M.S. SAINI (1986): Feeding ecology of the Large Grey Babbler *Turdoides malcolmi*. *Proc. Indian Acad. Sci. (Anim. Sci.)* 95: 429-436.
- WILSON, M.F. (1972): Seed size preferences in finches. *Wilson Bull.* 84: 449-455.